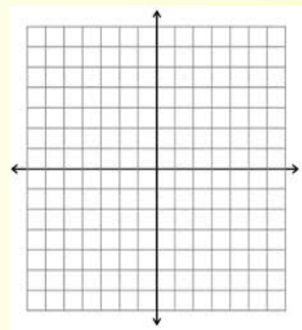
Alg. 2 Warm Up #2-5

1. completely factor:

   a) $2x^2 - 18$ b) $5x^2 + 15x + 10$ c) $4x^3 - 100x$

2. Graph the function and its inverse:

   $f(x) = \sqrt{x + 4}$



METHODS AND MEANINGS p. 219

MATH NOTES

Notation for Inverses

When given a function $f(x)$, the notation for the inverse of the function is $f^{-1}(x)$. Note that the -1 is not a negative exponent. It is the mathematical symbol that indicates the "undo" or inverse function of $f(x)$.

For example, if $f(x) = x^3 - 1$ then $f^{-1}(x) = \sqrt[3]{x+1}$.

This same inverse notation is used to identify the inverse of trigonometric functions. For example the inverse of $\sin(x)$ is written $\sin^{-1}(x)$.

Graphs of inverses are a reflection in the line $y = x$

Inverse writing shortcut:

1) Swap x & y
2) Solve for y

Methods and Meanings p. 233

Math Notes

Logarithms and Their Notation

A **logarithm** (called a "log" for short) is an exponent. An expression in logarithmic form, such as $\log_2(32)$, is read, *"the log, base 2, of 32."* To evaluate log expressions, think of the exponent: $\log_2(32) = 5$, because the exponent needed for base 2 to become 32 is 5.

An equation in logarithmic form is equivalent to another equation in exponential form, as shown at right. This conversion helps show why (based on an $x \to y$ interchange) $y = \log_b(x)$ and $y = b^x$ are inverse functions.

$$y = \log_b(x) \iff b^y = x$$

exponent

$$y = \log_2 x \longleftarrow \text{Equivalent} \longrightarrow 2^y = x$$

base

Inverse:

$x = \log_2 y$

$2^x = y$

Equivalent

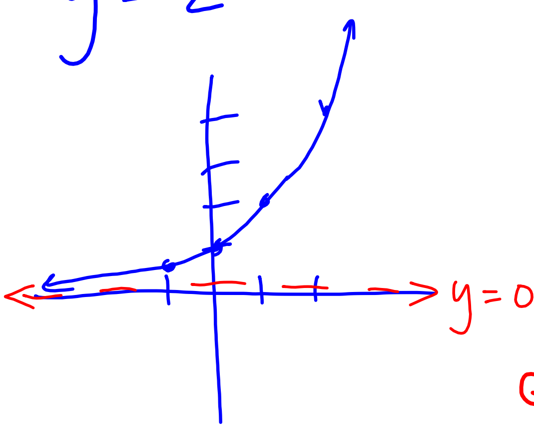
HW Questions:

Review & Preview

5-84. Write the equation of an increasing exponential function that has a horizontal asymptote at $y = 15$.

$y = 2^x$

x	y
0	1
1	2
2	4
-1	$\frac{1}{2}$



Go up 15

$y = 2^x + 15$

5-85. If $x = 7^y$, how would you write this equation in $y =$ form? Explain.

$y = \log_7 x$

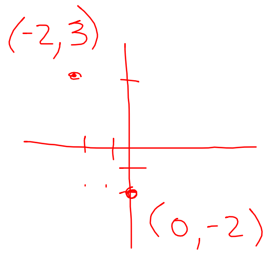
5-86. Solve for n: $n^3 = 49$.

$n = \sqrt[3]{49}$

5-87. A circle has the equation $x^2 + (y+2)^2 = r^2$. If the circle is shifted 2 units to the left, 5 units up, and the radius is doubled, what will its new equation be?

$(x+2)^2 + (y-3)^2 = 4r^2$

$(2r)^2$



5-88. On Wednesdays at Tara's Taqueria four tacos are the same price as three burritos. Last Wednesday the Lunch Bunch ordered five tacos and six burritos, and their total bill was \$8.58 (with no tax or drinks included). Nobody in the Lunch Bunch can remember the cost of one of Tara's tacos. Help them figure it out.

Let t = cost of a taco
b = cost of a burrito

$$\begin{cases} 4t = 3b \\ 5t + 6b = 8.58 \end{cases}$$

$2(4t - 3b = 0)$

$8t - 6b = 0$

$5t + 6b = 8.58$

5-89. Graph the two functions at right on the same set of axes.

$y = 3(2^x)$

$y = 3(2^x) + 10$

a. How do the two graphs compare?

b. Suppose the first equation is $y = km^x$ and the graph is shifted up b units. What is the new equation?

$$y = km^x + b$$

5-90. Solve each equation or inequality.

a. $|x-1| = 9$

b. $2|x+1| + 3 = 9$

c. $|x-1| < 3$

d. $|x+5| \geq 8$

5-91. Factor each expression below.

a. $x^2 + 8x$

b. $x^2y^2 - 81z^2$

c. $2x^2 + 14x - 16$

d. $3x^2 - 11x - 4$

$$(xy+9z)(xy-9z)$$

5-92. For each of the following rational expressions, add or subtract, then simplify.

a. $\frac{2-x}{x+4}+\frac{3x+6}{x+4} = \frac{2x+8}{x+4} = \frac{2\cancel{(x+4)}}{\cancel{(x+4)}}$

b. $\frac{3}{(x+2)(x+3)}+\frac{x}{(x+2)(x+3)} = \frac{1}{x+2}$

c. $\frac{3}{x-1}-\frac{2}{x-2}$

LCD $=(x-1)(x-2)$

$$\frac{(x-2)}{(x-2)}\cdot\frac{3}{(x-1)} - \frac{2}{(x-2)}\cdot\frac{(x-1)}{(x-1)}$$

$$\frac{3x-6}{(x-2)(x-1)} - \frac{(2x-2)}{(x-2)(x-1)}$$

$$\frac{3x-6-2x+2}{(x-2)(x-1)}$$

$$\frac{x-4}{(x-2)(x-1)}$$

d. $\frac{(x+2)}{(x+2)}\cdot\frac{8}{x}-\frac{4}{x+2}\cdot\frac{x}{x}$

$$\frac{8x+16-4x}{x(x+2)}$$

$$\frac{4x+16}{x(x+2)}$$

$$\frac{4(x+4)}{x(x+2)}$$

$$\frac{4x+16}{x^2+2x}$$

CP's: 5.2.3 Salmon worksheet

Remember: Investigating a function

- Multiple representations
- Domain and Range
- Intercepts
- Special Points $(1,0)$ h, k
- Symmetry
- Asymptotes
- Continuous or Discrete
- Shape: curved or straight

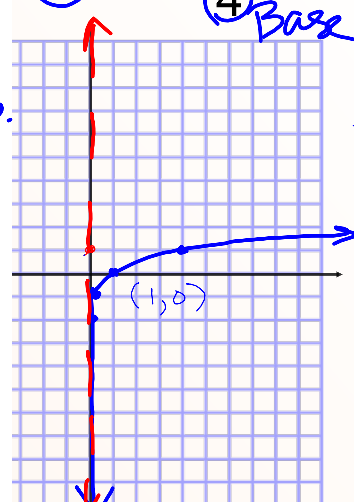
exp.

$y = \log_4 x$ Base

$4^y = x$

exp.

x	y
1/16	-2
1/4	-1
1	0
4	1
16	2



$x = 0$

domain

$x > 0$

range: $y = \mathbb{R}$

CP's: 5.2.3 Salmon worksheet

backside questions:

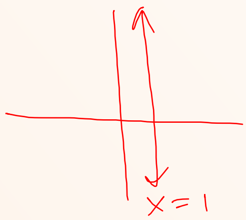
$y = \log_b x$

$b \neq 1$

$b = 1$? $\quad y = \log_1 x$

$1^y = x$

x	y
1	1
1	-1
1	0



CP's: 5.2.3 Salmon worksheet

backside questions:

$y = \log_b x$

$b = 0$? $\quad y = \log_0 x$

$0^y = x$

$0^{-1} = \frac{1}{0}$

0^0 ← indeterminate

x	y
0	1
0	2
undef	-1
	0

$0^2 = 0$

$0^4 = 0$

$0^{-1} =$ undef

$y^0 = 1$

$59^0 = 1$

$7^0 = 1$

$(-7)^0 = 1$

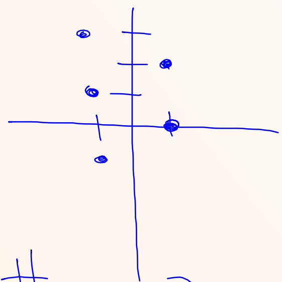
CP's: 5.2.3 Salmon worksheet

backside questions: $y = \log_b x$

$b = -1$ $\quad y = \log_{(-1)} x \longrightarrow (-1)^y = x$

$(-1)^{-1} = \left(\frac{1}{-1}\right)^1$

x	y
-1	1
1	2
-1	3
1	0
-1	-1



Not a function.

base # > 0, base ≠ 1

Finish up and turn in:

<u>Week 2 Classwork</u>

Warm Up

5 - # 19 ---> 23

5 - # 40 ---> 44

5 - # 55 ---> 58 (pink)

5 - # 68 ---> 71 (blue)

5.2.3 Revised (salmon)

Remember describing transformations:

Parent	General form
$y = x^2$	$y = a(x-h)^2 + k$
$y = \sqrt{x}$	$y = a\sqrt{x-h} + k$
$y = \dfrac{1}{x}$	$y = \dfrac{a}{1}\left(\dfrac{1}{x-h}\right) + k$
	$y = \dfrac{a}{x-h} + k$

Transformations

h → horizontal translation

k → vertical translation

If a>1, vertical stretch

If 0<a<1, vertical compression

If a<0, reflection in the x-axis

Describe the transformations of the parent graph to:

a) $y = -6(x + 5)^2 - 4$

b) $y = \frac{2}{7}\sqrt{x - 3} + 2$

Today's Classwork: Yellow, 5.2.4 revised

HW: 5 -

96 ---> 104

Chapter 5 test next Wed.
includes:

Absolute Value Inequalities
Quadratic Inequalities
Factoring
Exponents
Inverses
Basic Logarithms